EXPLORING THE SPATIOTEMPORAL IMPACT OF THE CHICAGO LARGE LOT PROGRAM ON INCIDENTS OF NEIGHBORHOOD CRIME

A RESEARCH PAPER

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Table of Contents

Introduction

Numerous recent studies have found a statistically significant relationship between the remediation of vacant lots and decreasing incidents of crime within the local area. Branas, Rubin and Guo (2012) and Branas, Kondo, Murphy, South and MacDonald (2016) found this relationship in Philadelphia, Pennsylvania; Kondo, Hohl, Han and Branas (2016) found this relationship in Youngstown, Ohio; and Sadler, Pizarro, Turchan, Gasteyer and McGarrell (2017) found this relationship in Flint, Michigan. These studies all considered the remediation of vacant lots as the lots' transformation into greenspace for community and/or private reuse. Few if any studies, however, have examined whether the transfer of vacant lots from absent, public ownership into local, private ownership, without consideration of the lots' post-sale land uses, has a statistically-significant impact on incidents of crime locally.

This paper fills this gap and examines the spatiotemporal impact of the City of Chicago's Large Lot Program on incidents of local crime. It uses a spatial statistical approach, through Emerging and Optimized Hot Spot Analysis, to analyze the change in incidents of crime within 500 feet of lots sold in the program's first year. The results did not indicate a statistically significant reduction in violent crime but did observe statistically significant reductions in property and drug crimes from 2013, the year prior to the program's creation, to 2017, the last full year of available crime data. These findings uphold the emerging, overall narrative that returning vacant lots to private management may be an effective strategy for reducing urban crime.

Background

While crime rates nationally are lower than at any point in recent American history, criminal activity remains a challenge for cities across the country—particularly in Chicago, Illinois where gun violence and homicides have reached record levels this decade (University of Chicago Crime Lab, 2017). According to the University of Chicago Crime Lab, homicides rose 58% between 2015 and 2016 while non-fatal shootings increased by 43% over the same time period. The South Side neighborhoods of Austin, Englewood, West Englewood, New City, and Greater Grand Crossing together accounted for 45% of the increased homicides across the city (University of Chicago Crime Lab, 2017).

Yet as violent crime rates have increased this decade, something different has been observed recently in the neighborhood of Englewood. According to the *Chicago Tribune,* violence in the neighborhood decreased in 2017. Shootings in Englewood were down 44% and homicides were down 45% over 2016. 193 shootings had taken place in the neighborhood as of November 2017 while 248 occurred in 2012 (Sweeney, 2017).

Criminal activity has a myriad of causes and solutions but one thing is clear when examining recent land use changes in Englewood: it has participated in the City of Chicago's Large Lot Program. Created in 2014, the City-run program sells selected city-owned lots for $1 to nearby landowners. Landowners cannot owe back taxes to either the City or the State of Illinois and must live on the same block as the lot/s that they purchase. This can include those living on the same side of the street or even across the road or alleyway. Residents cannot sell the lot/s they purchase for five years but otherwise have the full flexibility of land uses permitted under the zoning code (Chicago Large Lots, n.d.). See Figure 1 for a map of where the program

neighborhoods are within the City of Chicago and Figure 2 for a map of the 2014 Large Lots by neighborhood.

One key component to the Large Lot Program is the requirement that landowners maintain the lots according to both City and program-specified standards. These lots are not intended to remain dilapidated and visually abandoned. If the new owner does not live adjacent to the property, s/he must fence it in with a material that allows sight-lines through 50% of the fence's perimeter. The lots also have to adhere to City maintenance standards—specifically in regards to weeds and vegetative upkeep (Chicago Large Lots, n.d.). These post-sale requirements ensure that neighborhood aesthetics improve and that the area is not continually disturbed by unkempt lawns and solid fencing barriers.

This paper's subject is analyzing the spatiotemporal impact of the Large Lot Program on neighborhood crime. Under both the eyes-on-the-street theory and broken windows theory, which will be described in the Theoretical Basis section, crime was expected to decrease as local residents took greater accountability for their properties and their aesthetics. Before delving into these theoretical constructs, there is one notable case of a resident seeing the program as a way to reduce crime in her neighborhood.

According to the *Chicago Tribune,* Ms. Asiaha Butler, an Englewood resident, purchased a Large Lot in 2014. After a shooting took place nearby in early 2017, Ms. Butler decided to use her lot to counter local violence. She sponsored regular community events on the lot, including a job fair, and used it as a community focal point. The *Chicago Tribune* reported that shootings in the immediate area decreased from 25 in 2016 to 10 as of November 2017 (Sweeney, 2017). The Large Lot Program empowered Ms. Butler to purchase the lot and make it a community

resource that appears to have resulted in a reduction of local crime.

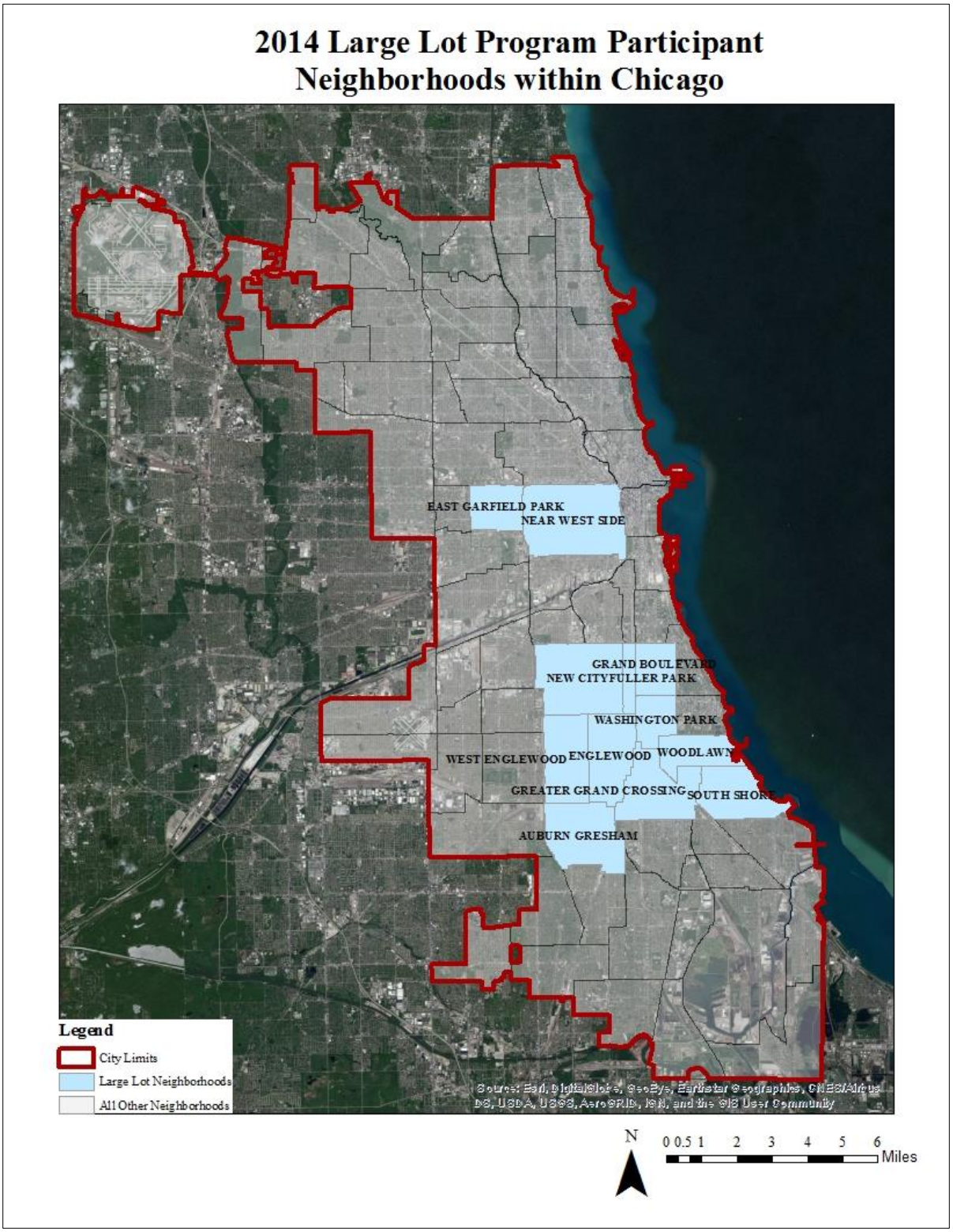

Figure 1- Neighborhoods in the City of Chicago Participating in the 2014 Large Lot Pilot Program.

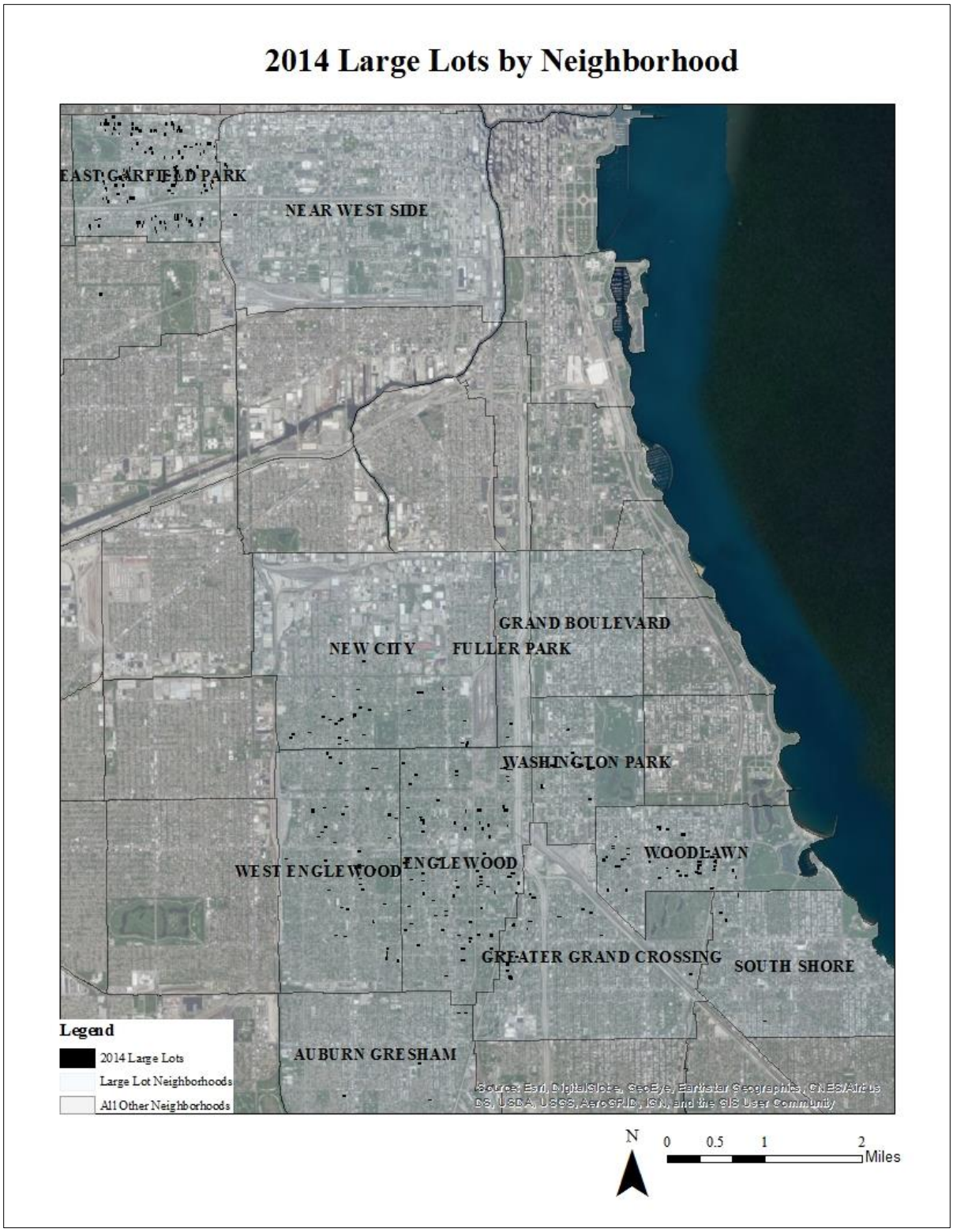

Figure 2- 2014 Large Lots by Neighborhood in the City of Chicago

Theoretical Basis

Eyes-On-The-Street Theory

This paper bases its premise, that the Large Lot Program has contributed to reduced localized crime, on two of the most paramount theories in urban planning: the eyes-on-the-street theory and broken windows theory. Jane Jacobs (1961) articulated the eyes-on-the-street theory in her 1961 book, *The Death and Life of Great American Cities*. In the book, Jacobs (1961) writes that "…there must be eyes upon the street, eyes belonging to those we might call natural proprietors of the street" in order to promote safety and reduce crime (1961, p. 35).

Others have built upon Jacob's premise that more eyes on the street increase public safety. Wekerle (2000) describes how Jacobs saw storefronts and public activity on the streets themselves as leading to the fulfillment of her theoretical premise while Oscar Newman saw environmental design as the solution. He proposed adding fences, gates, buzzers, and other design solutions as creating defined spaces where the eyes should be directed to (Wekerle, 2000). Patrick Donnelley (2010) describes how Newman articulated that by creating smaller spaces of opportunity for crime, more eyes could be directed towards the spaces and crime prevented (Donnelly, 2010). While Newman ultimately created defensible space theory, his fundamental arguments can be traced back to Jane Jacobs' perspective.

Jacobs directed the focus of her argument towards businesses and pedestrian activities but the same fundamental argument can be directed towards vacant residential lots. If the lots become actively managed by a nearby resident, more eyes are directed towards the lots and criminal activity that may have occurred on the lot is more likely to be noticed and either reported or prevented. As fences are constructed around Large Lots and opportune places for

criminal activity decrease, more eyes can be directed towards the areas that are still available and crime can be deterred.

The Broken Windows Theory

The second theoretical basis for this paper is the broken windows theory. First articulated by Kelling and Wilson for law enforcement personnel in a 1982 edition of *The Atlantic*, the theory attests that "…if a window in a building is broken and left unrepaired, all the rest of the windows will soon be broken" (Kelling & Wilson, 1982). They describe how one property could become abandoned, weeds take over, a window is broken, and the abandonment of the one parcel snowballs into deteriorated surroundings and, eventually, the entire neighborhood becomes dilapidated and violent (Kelling & Wilson, 1982). Ostensibly, the Large Lot Program should reverse this broken windows trend as vacant lots become used by local residents and abide to City maintenance standards.

Initiatives to reverse the broken windows theory trend can increase perceptions of safety and order in neighborhoods. Johansen, Neal, and Gaseteyer (2015) found that members of a Flint, Michigan neighborhood association felt that abandonment and vacancy in their neighborhood led to increases in crime. Through landscape improvements to vacant lots and beautification measures on abandoned structures, the neighborhood association aimed to make the neighborhood appear safer and, in turn, actually make it safer (Johansen et al., 2015). Through transferring city-owned vacant lots into private ownership and completing the required clean-up measures, Chicago residents could also feel a sense of safety from the neighborhood appearing more normal and have a subsequent increase in actual safety.

Keizer, Lindenberg, and Steg (2008) conducted six field experiments to test the broken windows theory's application to real-world settings and see whether a disorderly environment

resulted in disorderly behaviors. They found that signs against norm-violating behaviors, and the lack of present examples for the prohibited behavior, resulted in less people engaging in such actions (Keizer et al., 2008). With the Large Lot Program's requirements that new landowners clean up the lots and fence them in if not living adjacently, criminal activity should decrease as the area shows signs that the area is more well-kept and that criminal activity is not as permissible as it seemingly was before in the visually-dilapidated surroundings.

These two classic urban planning theories, eyes-on-the-street theory and broken windows theory, reinforce this paper's argument that vacant lots' return to local private management should reduce crime. Landowners under Chicago's Large Lot Program are nearby residents who likely keep eyes on their private property. The program's requirement that lots are cleaned up and maintained contributes to breaking the cycle of abandonment's consequences in the inner-city neighborhoods.

Literature Review

Research on the impact of vacant lot remediation and reductions in crime is relatively new but is growing. Numerous studies from cities across the country have studied the impact of various vacant lot remediation programs and found statistically-significant reductions in various forms of crime. This paper's assumptions were, in part, based on existing literature and its methodology but it was largely based on the research done by Sadler, Pizarro, Turchan, Gasteyer, and McGarrell (2017).

Sadler and others (2017) studied the relationship between lots greened under Flint, Michigan's Clean and Green Program and incidents of violent, property, and victimless crimes within 500 feet of greened lots from 2005 to 2014. They used hot spot analysis to identify hot

and cold spots for crime. Hot spots are areas in which there are a statistically high number of points while cold spots are areas in which there are a statistically low number of points (ESRI, 2016). Sadler and others then derived statistical measures of significance from those results and used regression methods to track the changes over time. The researchers found a significant inverse relationship between the greened lots and crime. The impact of the greening on crime reduction strengthened as time passed and resulted in statistically significant crime reductions in areas in proximity to these greened lots (Sadler et al., 2017).

Branas, Rubin, and Guo (2012) researched the association between abandoned properties and aggravated assaults in Philadelphia, Pennsylvania. Branas and others (2012) hypothesized that aggravated assaults and vacant properties would be strongly associated. Using regression models that controlled for demographic and socioeconomic variables, they studied the relationship between abandoned properties and aggravated assaults, gun assaults, and non-gun assaults from 2002-2006. They found a statistically significant association after controlling for demographic and socioeconomic variables. Census block groups with more abandoned properties were found to have a higher risk of aggravated assaults than those with fewer of those properties (Branas et al., 2012).

Branas and others (2016) narrowed their focus onto the relationship between remediating both abandoned buildings and vacant lots on firearm, non-firearm, and total aggravated assaults. They used two quasi-experimental differences-in-differences analyses, controlling for sociodemographic variables, to derive their results. Abandoned homes were studied from 2010-2013 and vacant lots were studied from 1998-2008. They used a regression model when finding statistically-significant reductions in firearm assaults for remediated abandoned homes and both firearm assaults and total assaults for greened vacant lots (Branas et al., 2016).

Branas and others (2016) found statistically significant reductions in firearm and aggravated assaults for remediated abandoned buildings but not for total and non-firearm aggravated assaults in either the unadjusted or regression-adjusted analyses. Both analyses found statistically significant reductions in firearm and total aggravated assaults, but not for non-firearm aggravated assaults, from remediating vacant lots (Branas et al., 2016).

Kondo, Hohl, Han, and Branas (2016) studied the relationship between vacant lots greened under Youngstown, Ohio's Lots of Green Program and incidents of crime within 1/8th of a mile and 1/4th of a mile of lots remediated between 2010-2014. They used a differences-in-differences analysis and controlled for demographic variables in their analyses (Kondo et al., 2016). Using a regression model, Kondo and others found in their 2016 study statistically-significant reductions in all forms of crime except for vehicle thefts. These incidents actually increased after the lots were remediated. Within 1/8th of a mile of treated lots, felony assaults and burglaries decreased. Within 1/4th of a mile, burglaries and robberies decreased. Active, community reuse of the lots was found to have more statistically significant reduction on crime than lots that were only cleaned up (Kondo et al., 2016).

These examples from Flint, Philadelphia, and Youngstown all show statistically-significant reductions in crime when vacant lots are remediated. Unlike these cases that focused on the greening vacant lots, this paper is not focusing specifically on one type of remediation method. This paper focuses on whether the lots' return to local private management alone resulted in a statistically-significant reduction in crime.

Methodology

Data Acquisition and Integration

This paper uses a spatial-statistical approach. It seeks to understand the spatiotemporal impact of the Large Lot Program on crime in proximity to lots sold by the program in 2014. Parcel data was obtained from the Cook County Data Portal while Chicago's corporate limits, neighborhood boundaries, and crime reports for the years 2013-2017 were obtained from the Chicago Data Portal. All crimes that had x-y coordinates were included in the analysis. Data on all 409 parcels sold in 2014 pilot for the Large Lot Program was obtained from the program's GitHub page. All data was projected in the NAD 1983 UTM 16N projected coordinate system and integrated using ESRI ArcGIS 10.5.1.

Analysis

This paper uses the Optimized Hot Spot Analysis (OHSA) and Emerging Hot Spot Analysis (EHSA) tools to test the impact of the Large Lot Program on local incidences of crime. Hot spot analysis is a spatial statistical analysis tool that can be used to spatiotemporally analyze changing crime patterns. Both EHSA and OHSA use the Getis-Ord-Gi* statistic to determine the significance of point clusters in particular areas (Gates, 2017). The Getis-Ord-Gi* statistic takes in attribute values and spatial weights in order to determine statistical significance with a Z-score. This Z-score is used to determine where high or low concentrations of values are spatially clustered. Hot spot analysis tools use these Z-score values and contrast them with neighboring values.

An area with a high number of statistically significant values will be a hot spot while an area with a low number of statistically significant values will be a cold spot (ESRI, n.d.). Z-scores above test-generated standard deviations will be considered hot while z-scores below the

standard deviations will be considered cold. Hot spot analysis tests also generate p-values. These values determine the probability of the results being correct. For instance, if the p-value is less than 0.05, there is a 95% confidence level for the value's accuracy. Other p-values used in hot spot analysis are less than 0.10 and less than 0.01. These thresholds indicate respectively 90% and 99% confidence values (ESRI, 2017b). In short, areas with high positive z-scores and a small p-values indicate hot spots while areas with low negative z-scores and p-values indicate cold spots.

Hot spot analysis can visualize statistically significant clusters of points and trends in how the points are distributed over time. This method was selected because it was the spatial statistical method used in the Sadler and others (2017) study investigating a similar topic and because is the best method to serve the purpose of this study based on the available data.

There are some differences between EHSA and OHSA. EHSA examines the clustering of points over time. It uses a space time cube to generate the analysis based on the Getis-Ord Gi* statistic (ESRIa, 2016). A space time cube creates layers where data is categorized by its x and y coordinates for its geographic location and z coordinates for its year (Sadler et al., 2017). The space time cube will use the Mann-Kendall trend test to determine the statistical significance of how the points are changing. The Mann-Kendal trend test uses rank correlation analysis when constructing the bin count and time sequence that make up the space time cube itself. Over time, a higher value than the preceding one is ranked as +1. If a value is lower than the preceding one, it is ranked as -1. Tied results, indicating no trend in how the points are distributed. P-values are also used for determining statistical significance in this test (ESRI, 2016c).

EHSA will result in an output with spots that show the statistical significance of clusters as well as the direction in which the clustering has been moving over time (ESRI, 2016a).

Results are interpreted based upon the hotness/coldness of a spot as well as how the area is changing. OHSA, meanwhile, does not consider results over multiple timespans. Its output will show the statistical significance of clusters as well as levels of confidence in the accuracy of the results based upon p-values (ESRI, 2017a). Results are interpreted by hotness/coldness of a spot as well as by confidence level.

EHSA was used to test the changes in crime patterns from 2013, the year prior to the program's creation, to 2017, the last full year with data available. A neighborhood time step of 12 months was used and the area within 500 feet of a sold 2014 Large Lot was used as the analysis polygon. Sadler and others (2017) used the same 500-foot distance in conducting their analysis. They assumed that the distance would equate to about a city block (Sadler et al., 2017). This distance was chosen for both the EHSA and OHSA tests in order to further the compatibility of the Sadler and others (2017) study with this paper.

OHSA examines the clustering of points in total and does not distinguish between different times. It was used to test crime incidents within each of the five years studied so that it could become apparent in how crime was changing over this paper's research timespan. As with the EHSA, it uses the Getis-Ord Gi* statistic to analyze the crime point features. The area within 500 feet of a sold 2014 Large Lot was used to limit the analysis from including areas outside of this study's scope (ESRI, 2017a).

Both tests were run for three subcategories of crime: 1) violent crimes, including assaults, criminal sexual assaults, homicides, human trafficking, kidnappings, robberies, and sex offenses; 2) property crimes, including arson, burglary, criminal damage, criminal trespassing, motor vehicle theft, and theft; and 3) drug crimes, including narcotics. These categories were chosen based on the methodology of the Sadler and others (2017) study and to see what impact, if any,

the Large Lot Program has had on different types of crime rather than compiling all types of crime into one overall test.

Findings

The results are displayed by subcategories of crime including violent crime, property crime, and drug crime. EHSA results for each type of crime are described first with text, a table, and a map. See Table 1 for a description of the types of hot and cold spots that emerge from EHSA tests. Annual OHSA results for each type of crime follow the respective EHSA results with text, a table, and maps of the results from the years 2013-2017.

Description of Types of Spots	
Type of Cold/Hot Spot	**Significance Requirements**
New	Statistically-significant in final time step but never before
Consecutive	A single, uninterrupted run of statistically significant spots in final time-step interval but never before
Intensifying	Significant spot for at least 90% of time intervals with intensifying observations
Persistent	Significant spot for at least 90% of time intervals with no significant change between intervals
Diminishing	Significant spot for at least 90% of time intervals with decreasing observations
Sporadic	Mixed results between significant and insignificant but never opposite intensity
Oscillating	Less than 90% of spots changed from hot to cold or cold to hot in final time interval
Historical	Final step not significant but at least 90% of previous time intervals were
(Source: ESRI, 2015)	

Table 1: Emerging Hot Spot Analysis Spot Types

Violent Crime

According to the EHSA results, there was not a statistically significant change in reported violent crime incidents within 500 feet of a 2014 Large Lot. The trend statistic from the space time cube was -0.1979 while the trend P-Value was 0.8431. This suggests that there was no statistically significant change in violent crime incidents. Hot spots of crime were concentrated in the East Garfield Park, West Englewood, and Woodlawn neighborhoods.

All of the new hot spots of crime emerged in Woodlawn. A wide cluster of cold spots emerged in an area encompassing northern Englewood, southern New City and Fuller Park, and western Washington Park. Clusters of cold spots also emerged in West Englewood and Greater Grand Crossing. While there was not a statistically significant change in violent crime overall, there were significant changes in these areas. See Table 2 for numerical results and Figure 3 for mapped results.

Violent Crime EHSA 2013-2017			
	Spot Type	**n**	**% of Total Significant Spots**
Hot Spots	New	9	2.1%
	Consecutive	44	10.3%
	Intensifying	42	9.8%
	Persistent	99	23.2%
	Diminishing	4	0.9%
	Sporadic	61	14.3%
	Oscillating	0	0.0%
	Historical	2	0.5%
Cold Spots	New	7	1.6%
	Consecutive	50	11.7%
	Intensifying	39	9.1%
	Persistent	34	8.0%
	Diminishing	0	0.0%
	Sporadic	36	8.4%
	Oscillating	0	0.0%
	Historical	0	0.0%
Total		427	100.0%

Table 2: Emerging Hot Spot Analysis Results for Violent Crime Incidents Between 2013-2017 by Spot Type

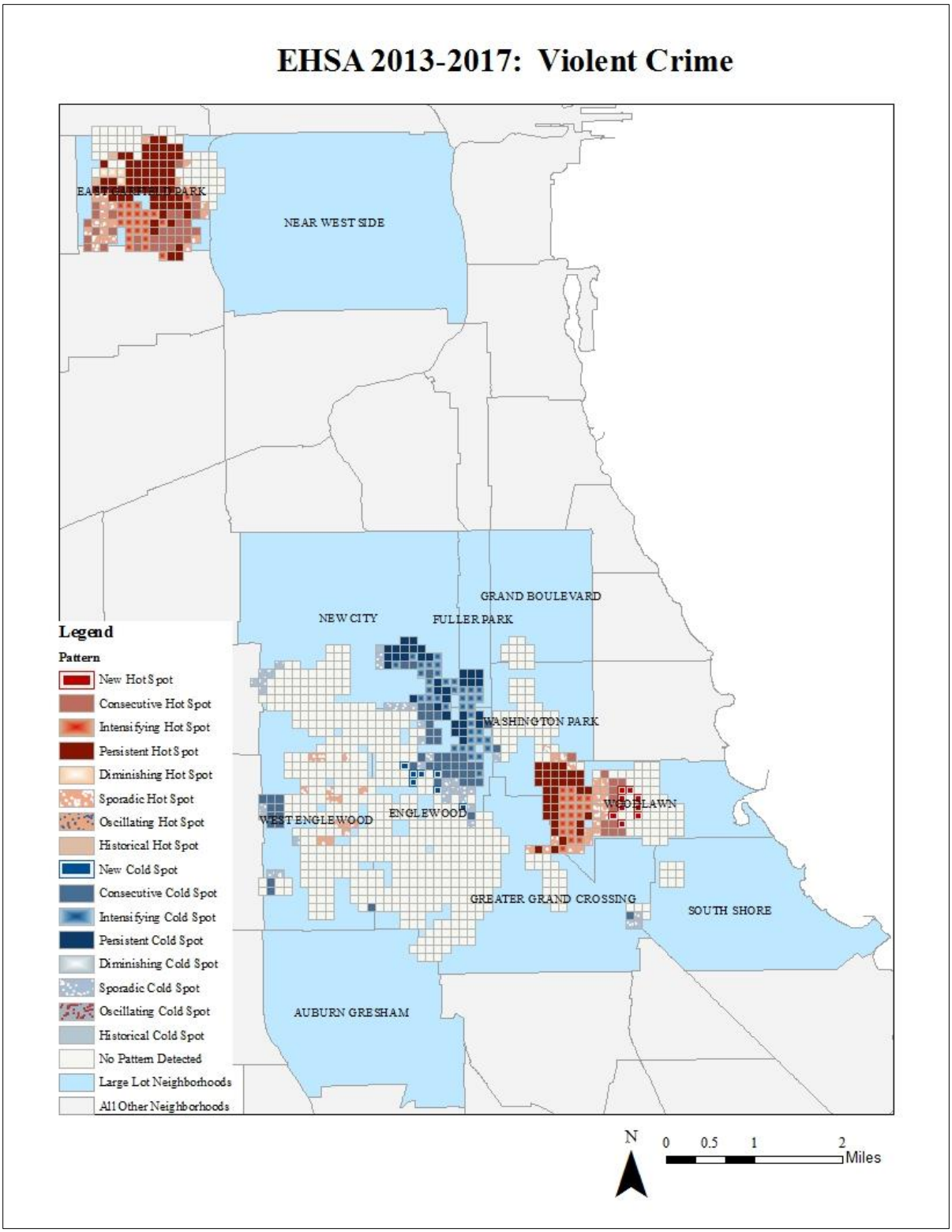

Figure 3- Emerging Hot Spot Analysis Results 2013-2017: Violent Crime

The OHSA results give a clearer picture of the year-by-year changes in violent crime incidents. There was a decrease in reported violent crime incidents, but this decrease was found statistically not significant. The mean decreased from 2.0688 in 2013 to 1.8045 in 2017 while the standard deviation decreased from 3.0776 to 2.7148. The annual OHSA maps show expansions in hot spots-- particularly in the Woodlawn and East Garfield Park neighborhoods. All hot spots were eliminated in Englewood and West Englewood while significant cold spots emerged in 2017 in Englewood, New City, and Fuller Park. If these South Side cold spots continue, future re-runs of this data could eventually show a statistically-significant decrease in violent crime. See Table 3 for numerical results and Figures 4-8 for mapped results.

OHSA Results: Violent Crime					
	2013	**2014**	**2015**	**2016**	**2017**
Polygon Cell Size	151m	151m	151m	151m	150m
Minimum	0	0	0	0	0
Maximum	31	22	25	29	26
Mean	2.0688	1.9355	1.7361	2.0122	1.8045
Std. Dev.	3.0776	2.8729	2.7855	3.0504	2.7148
Total Number (Weighted Polygons)	1148	1148	1148	1148	1187
Statistically Significant Output	48	51	113	50	218

Table 3: Optimized Hot Spot Analysis Results for Violent Crime Incidents

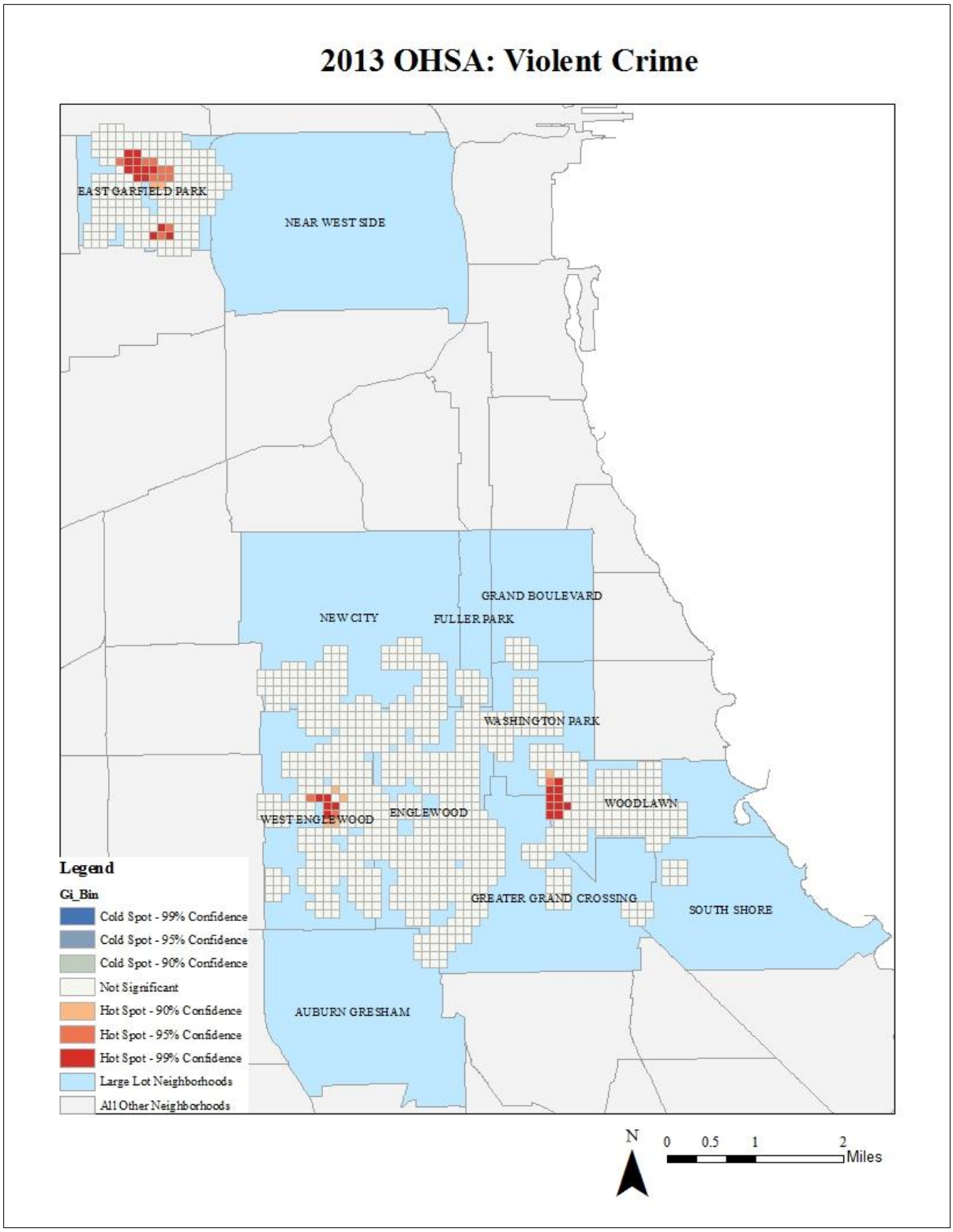

Figure 4- Optimized Hot Spot Analysis Results: 2013-Violent Crime

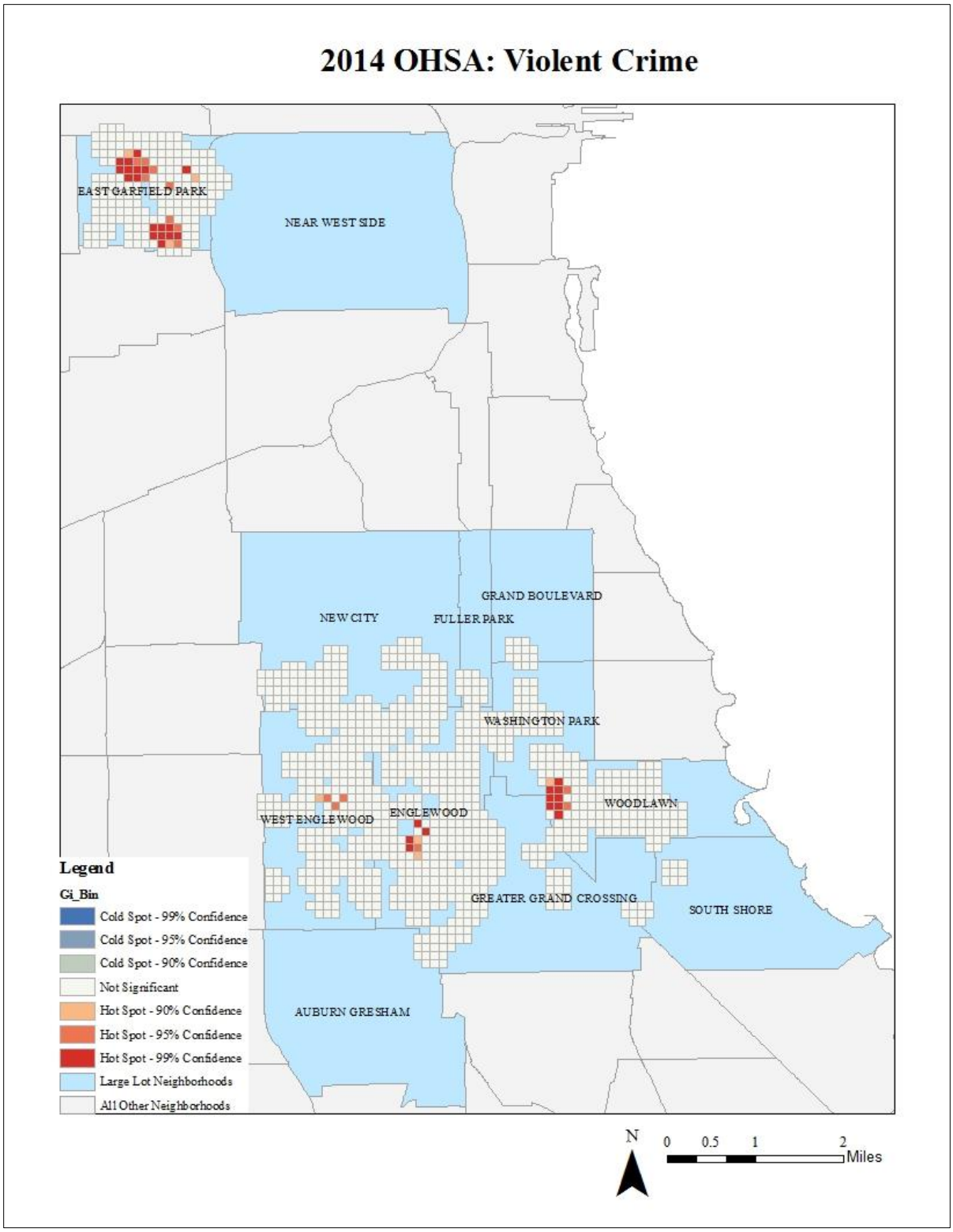

Figure 5- Optimized Hot Spot Analysis Results: 2014-Violent Crime

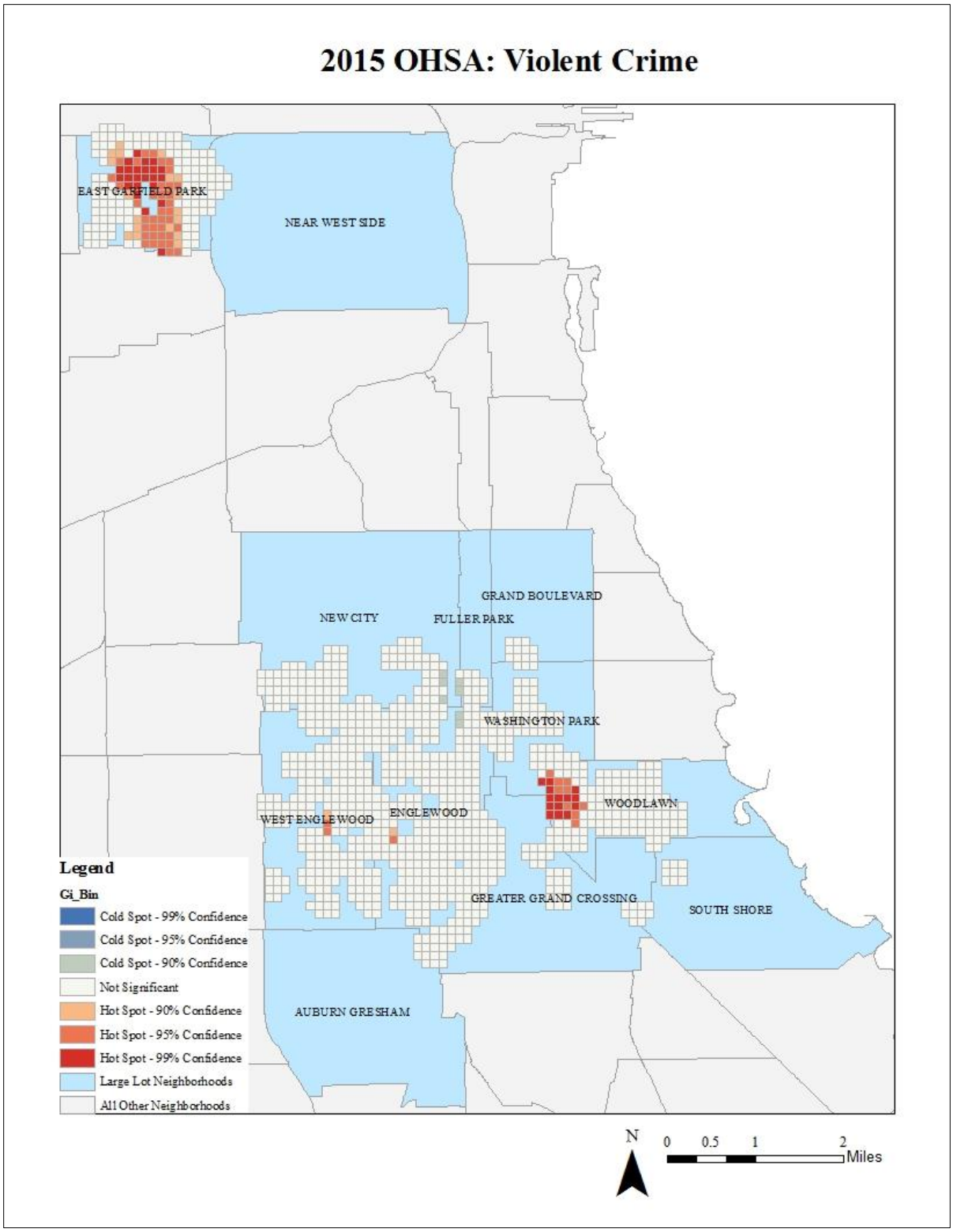

Figure 6- Optimized Hot Spot Analysis Results: 2015-Violent Crime

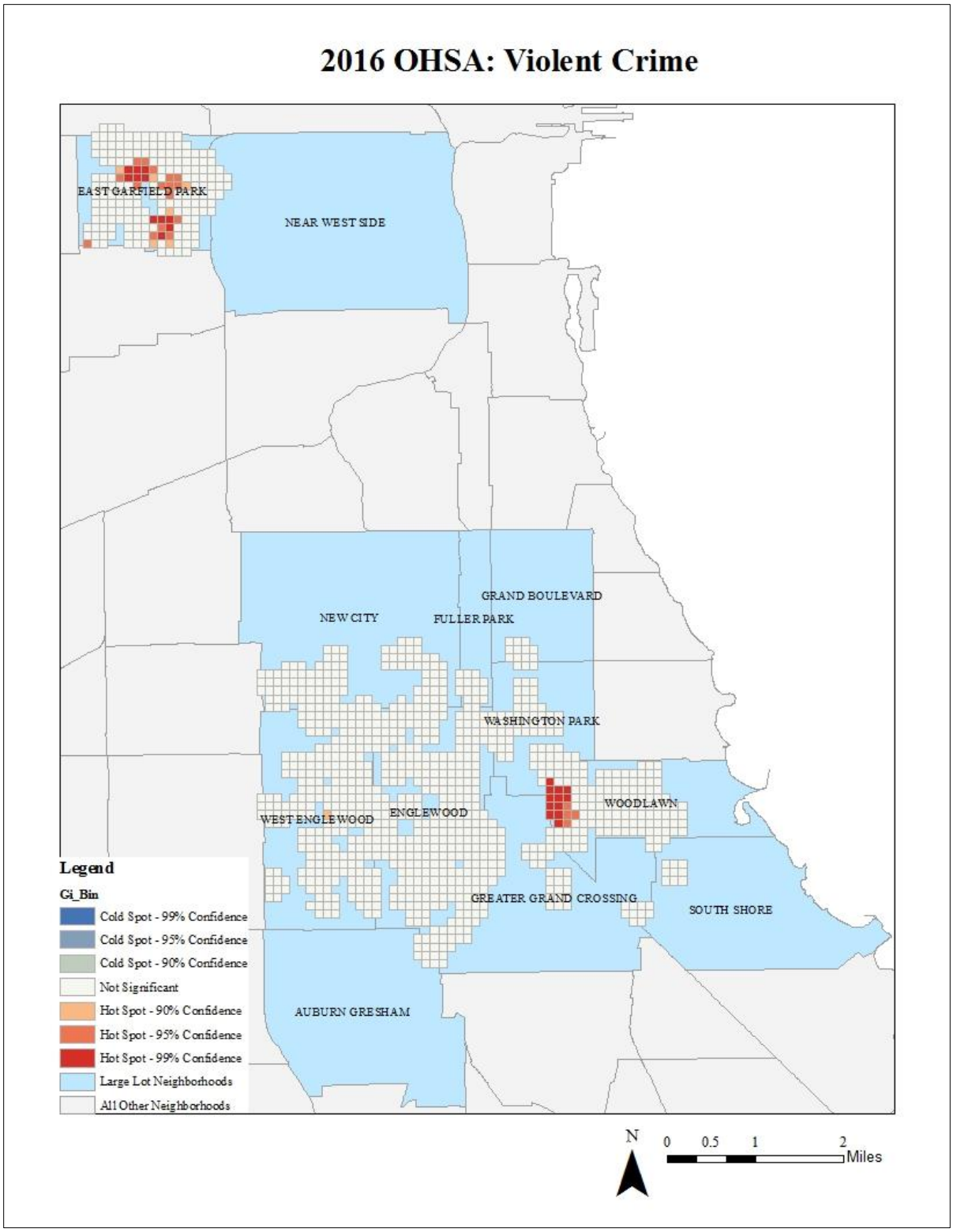

Figure 7- Optimized Hot Spot Analysis Results: 2016-Violent Crime

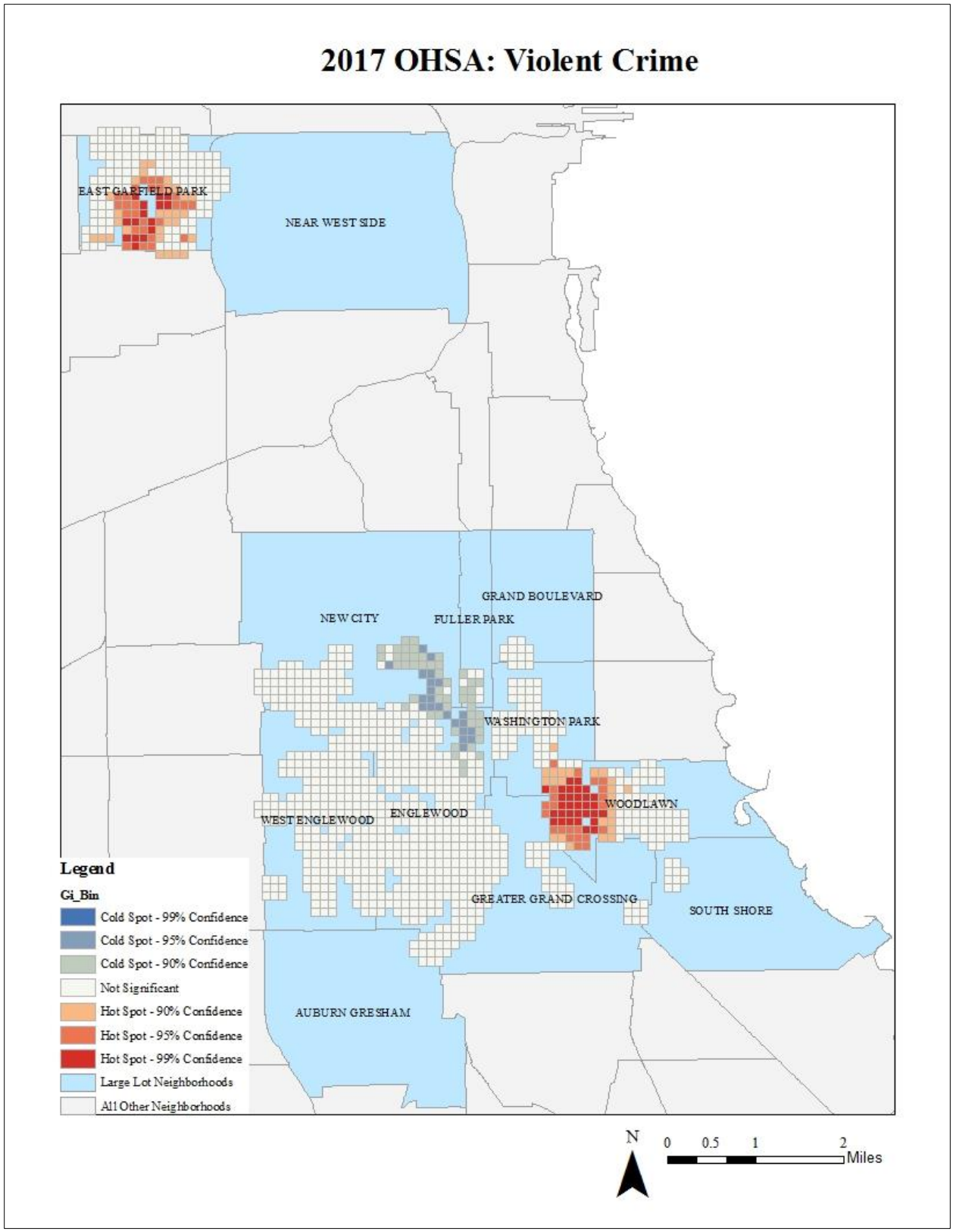

Figure 8- Optimized Hot Spot Analysis Results: 2017-Violent Crime

Property Crime

According to the EHSA results, there was a significant decrease in reported property crime incidents within 500 feet of a 2014 Large Lot. The Trend Statistic was -1.8805 while the Trend P-Value was 0.06. This suggests there was a statistically significant decrease in property crime incidents. Hot spots of crime were concentrated in East Garfield Park, Woodlawn, and Washington Park but no new hot spots of crime emerged from 2013-2017. Meanwhile, a large cluster of cold spots emerged in northern Englewood, southern New City and Fuller Park in a similar place as with violent crime. New cold spots of property crime emerged in Englewood, West Englewood, and Greater Grand Crossing. See Table 4 for numerical results and Figure 9 for mapped results.

Property Crime EHSA 2013-2017			
	Spot Type	**n**	**% of Total Significant Spots**
Hot Spots	New	0	0.0%
	Consecutive	1	0.2%
	Intensifying	34	6.0%
	Persistent	118	21.0%
	Diminishing	11	2.0%
	Sporadic	54	9.6%
	Oscillating	0	0.0%
	Historical	0	0.0%
Cold Spots	New	12	2.1%
	Consecutive	103	18.3%
	Intensifying	86	15.3%
	Persistent	4	0.7%
	Diminishing	0	0.0%
	Sporadic	108	19.2%
	Oscillating	31	5.5%
	Historical	0	0.0%
Total		562	100.0%

Table 4: Emerging Hot Spot Analysis Results for Property Crime Incidents Between 2013-2017 by Spot Type

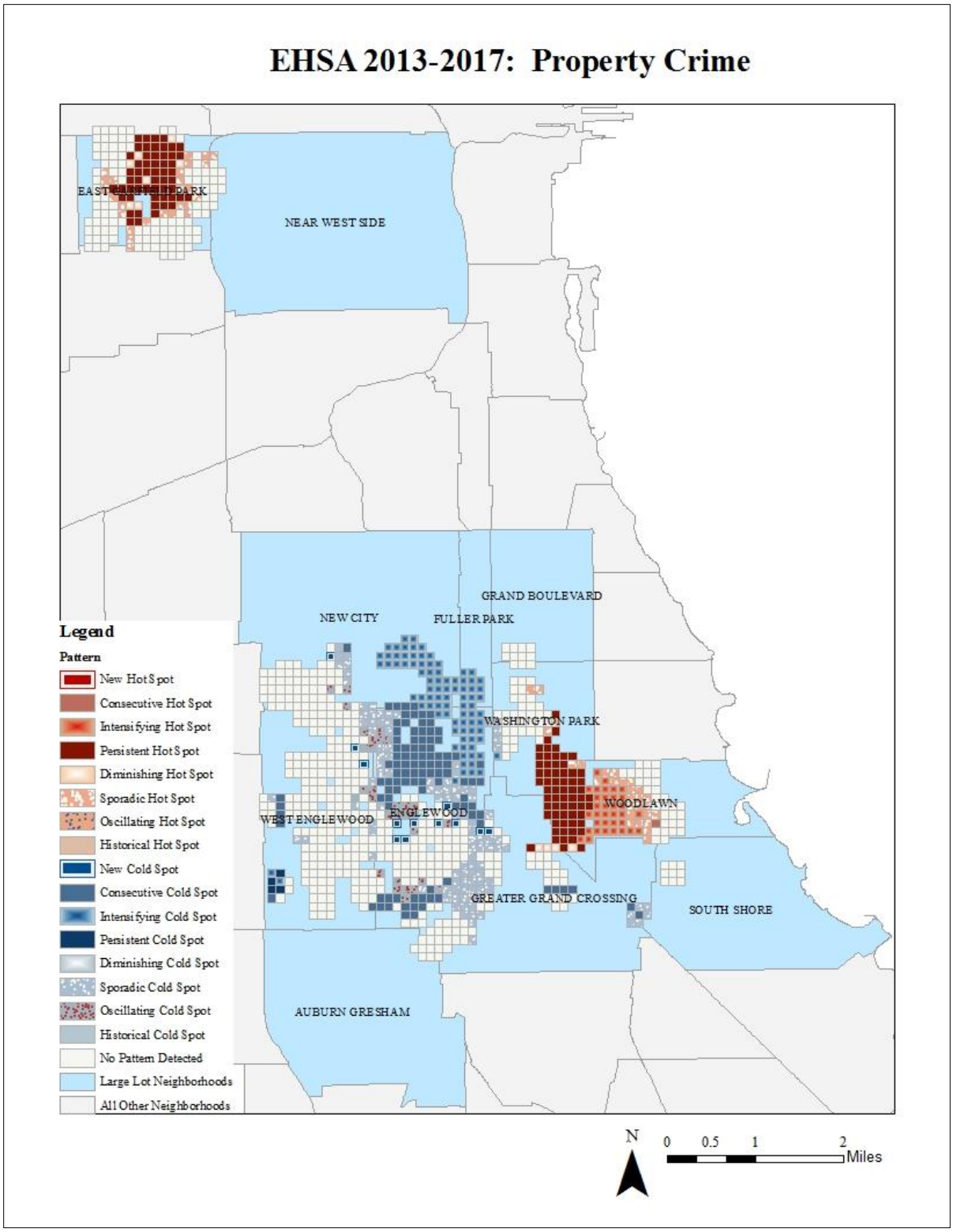

Figure 9- Emerging Hot Spot Analysis Results 2013-2017: Property Crime

According to the annual OHSA results, there was a significant decrease in property crime incidents. The mean decreased from 6.2002 in 2013 to 4.716 in 2017 while the standard deviation decreased from 8.8837 to 6.3321. Over these five years, a large cluster of cold spots emerged in the same areas of New City, Fuller Park, and Englewood that saw a clustering of cold spots emerge for violent crime; however, the coldness of this area had waned by 2017. Clusters of hot spots increased in Woodlawn and East Garfield Park but decreased in East Garfield Park by 2017. See Table 5 for numerical results and Figures 10-14 for mapped results.

OHSA Results: Property Crime					
	2013	**2014**	**2015**	**2016**	**2017**
Polygon Cell Size	152m	151m	152m	152m	151m
Minimum	0	0	0	0	0
Maximum	122	62	62	94	52
Mean	6.2002	5.0932	4.7857	4.9233	4.716
Std. Dev.	8.8837	6.8417	6.4086	6.8875	6.3321
Total Number (Weighted Polygons)	1134	1148	1134	1134	1148
Statistically Significant Output	105	193	183	240	148

Table 5: Optimized Hot Spot Analysis Results for Property Crime Incidents

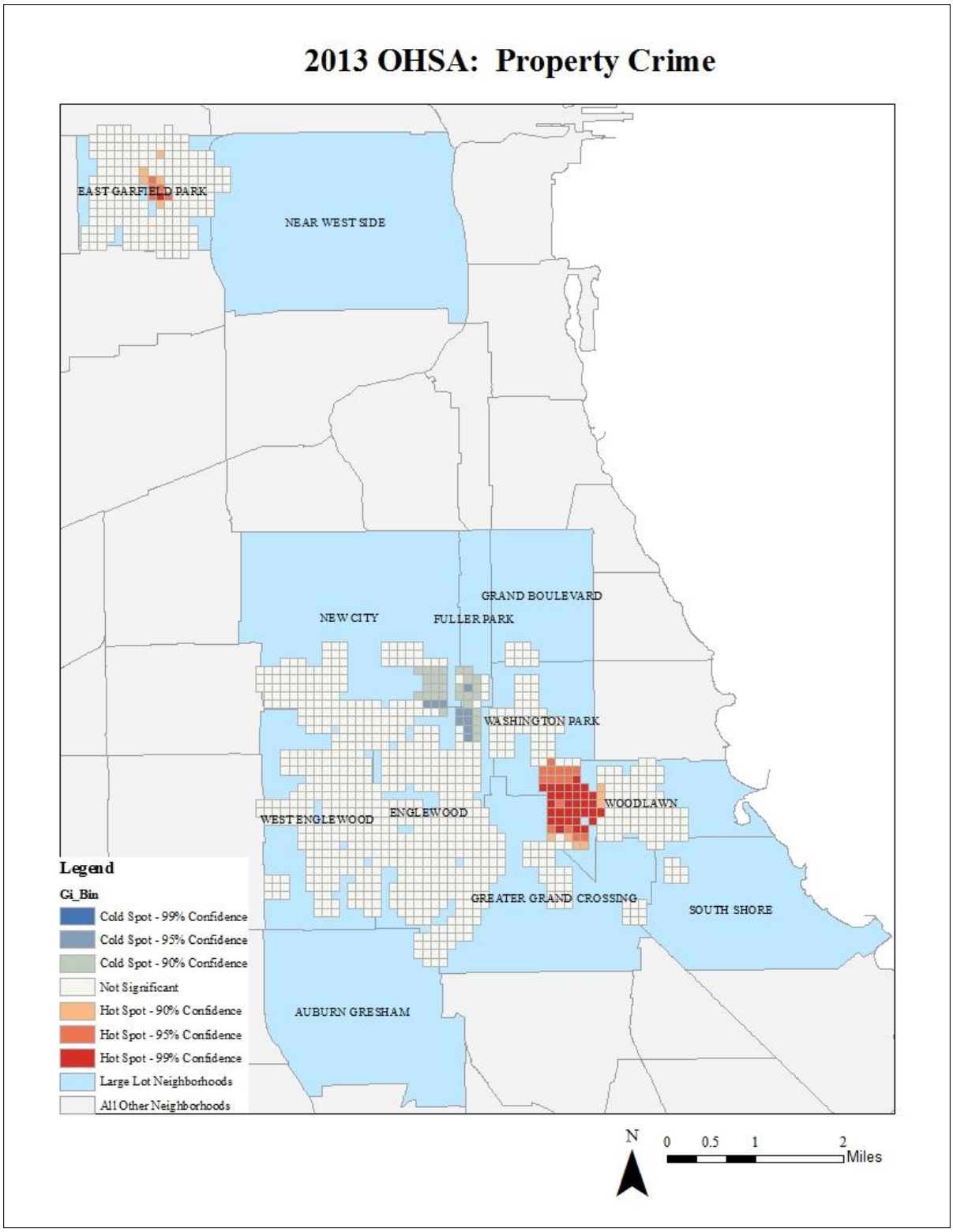

Figure 10- Optimized Hot Spot Analysis Results: 2013-Property Crime

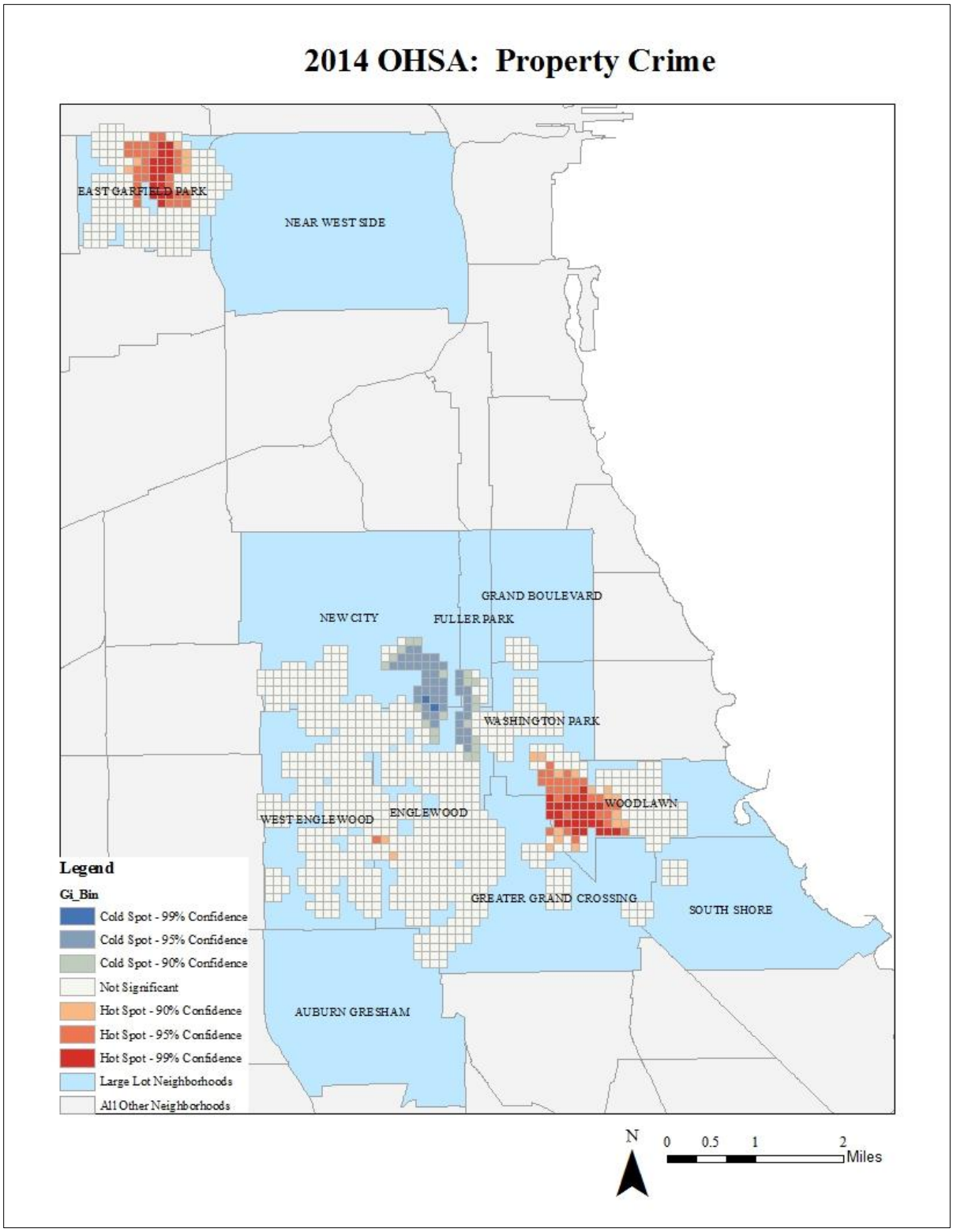

Figure 11- Optimized Hot Spot Analysis Results: 2014-Property Crime

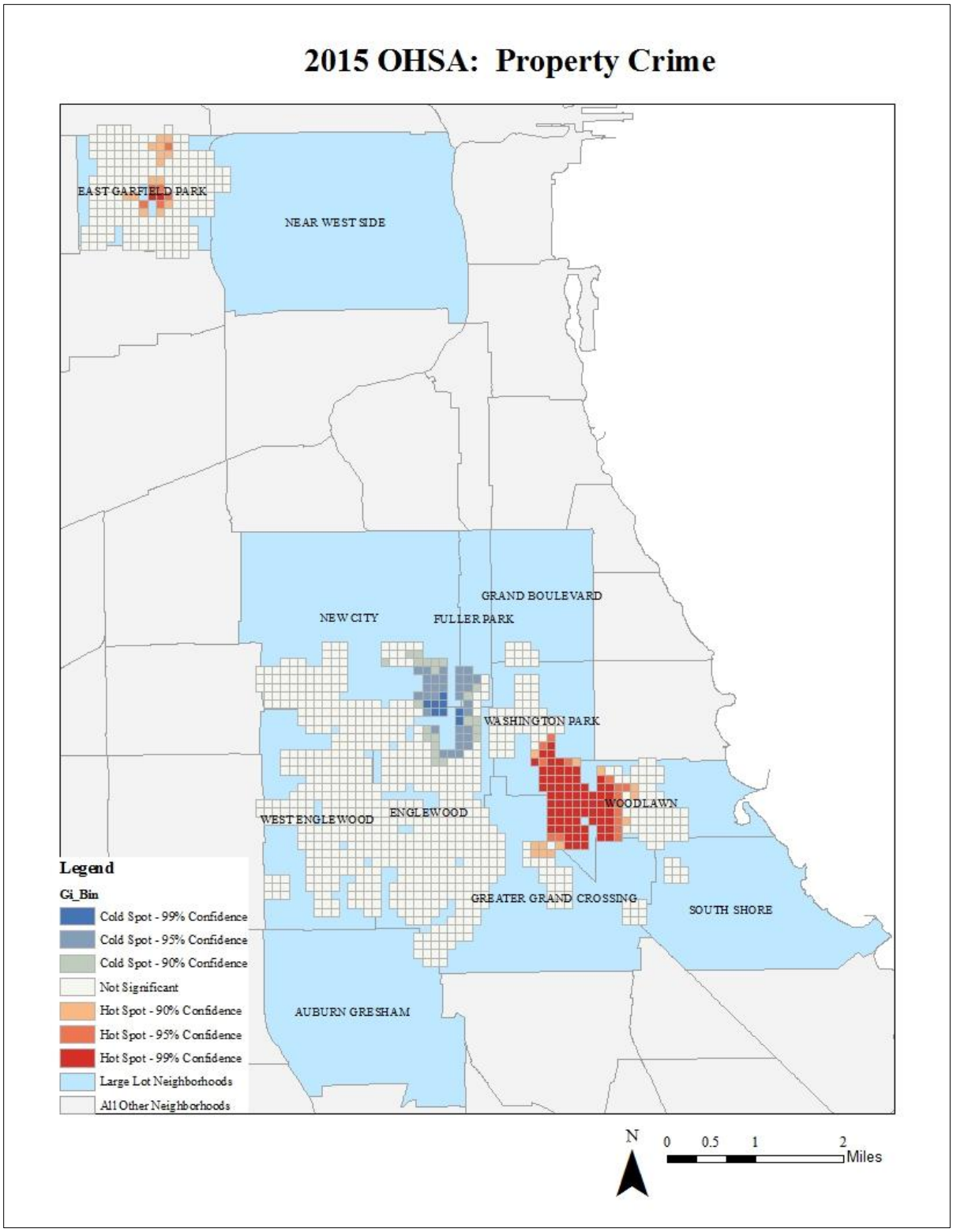

Figure 12- Optimized Hot Spot Analysis Results: 2015-Property Crime

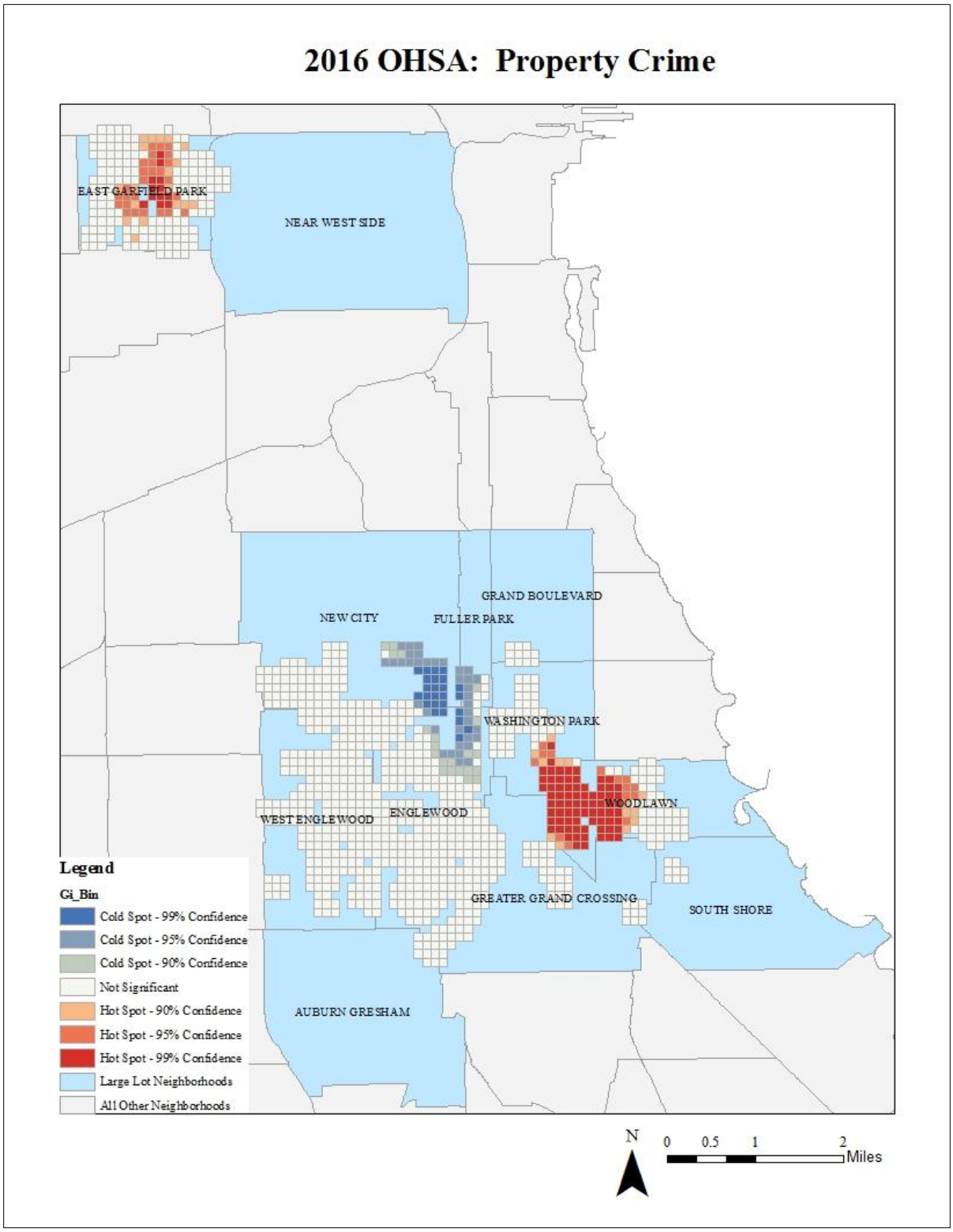

Figure 13- Optimized Hot Spot Analysis Results: 2016-Property Crime

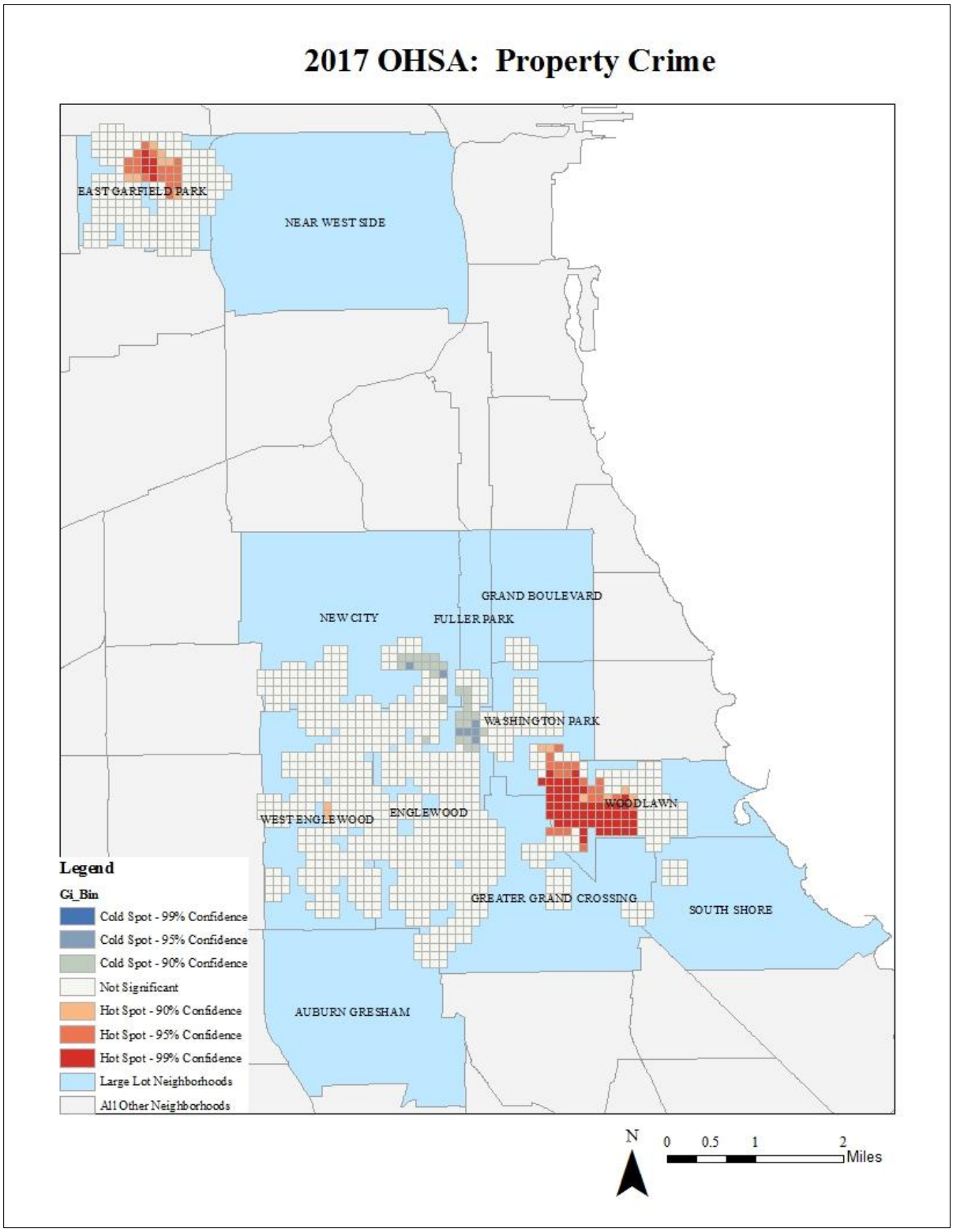

Figure 14- Optimized Hot Spot Analysis Results: 2017-Property Crime

Drug Crime

According to the EHSA results, there was a statistically significant decrease in reported drug crime incidents within 500 feet of a 2014 Large Lot. The Trend statistic was -4.1569 while the Trend P-Value was 0.00. This suggests that there was a statistically significant decrease in drug crime incidents. Nearly all of the South Side was either a persistent cold spot or an oscillating cold spot with no hot spots recorded. New cold spots emerged in the Grand Boulevard, Washington Park, Woodlawn, West Englewood, Englewood, and Greater Grand Crossing neighborhoods. Most of the West Side neighborhood of East Garfield Park was a diminishing hot spot but no cold spots were recorded in the neighborhood. See Table 6 for numerical results and Figure 15 for mapped results.

Drug Crime EHSA 2013-2017			
	Spot Type	**n**	**% of Total Significant Spots**
Hot Spots	New	0	0.0%
	Consecutive	0	0.0%
	Intensifying	0	0.0%
	Persistent	6	0.7%
	Diminishing	66	7.2%
	Sporadic	7	0.8%
	Oscillating	0	0.0%
	Historical	12	1.3%
Cold Spots	New	17	1.9%
	Consecutive	547	59.8%
	Intensifying	20	2.2%
	Persistent	0	0.0%
	Diminishing	0	0.0%
	Sporadic	34	3.7%
	Oscillating	206	22.5%
	Historical	0	0.0%
Total		915	100.0%

Table 6: Emerging Hot Spot Analysis Results for Drug Crime Incidents between 2013-2017 by Spot Type

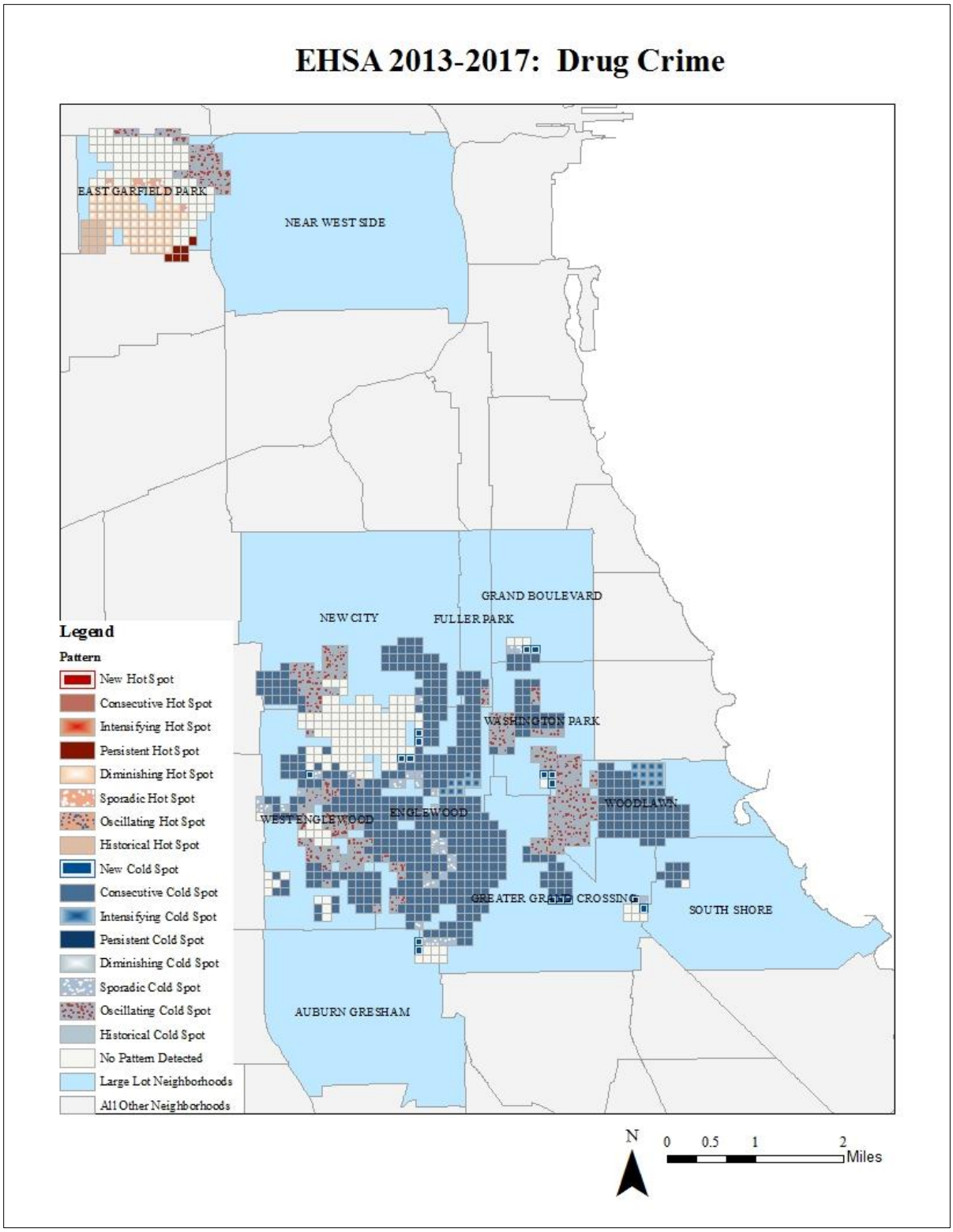

Figure 15- Emerging Hot Spot Analysis Results 2013-2017: Drug Crime

According to the annual OHSA results, there was a significant decrease in drug crime incidents. The mean decreased from 2.7674 in 2013 to 0.8621 in 2017 while the standard deviation decreased from 6.1748 to 2.7551. From 2013-2015, nearly all of the East Garfield neighborhood was within a hot spot for drug crimes. After that year, the northern half of the neighborhood became a cold spot while much of the Englewood and West Englewood neighborhoods became hot spots for drug crimes. By 2017, nearly all of East Garfield Park was again a hot spot while a large cluster of hot spots remained in Englewood and West Englewood. This is despite the overall decrease in drug crimes. This suggests that the hot spots of drug crimes are remaining clustered in certain areas despite the considerable decline in reported drug crime incidents. See Table 7 for numerical results and Figures 16-20 for mapped results.

OHSA Results: Drug Crime					
	2013	2014	2015	2016	2017
Polygon Cell Size	151m	152m	152m	152m	147m
Minimum	0	0	0	0	0
Maximum	60	78	69	48	35
Mean	2.7674	2.47	1.9815	0.7686	0.8621
Std. Dev.	6.1748	6.5555	5.4869	2.8524	2.7551
Total Number (Weighted Polygons)	1148	1134	1134	1301	1211
Statistically Significant Output	128	134	131	259	174

Table 7: Optimized Hot Spot Analysis Results for Drug Crime Incidents

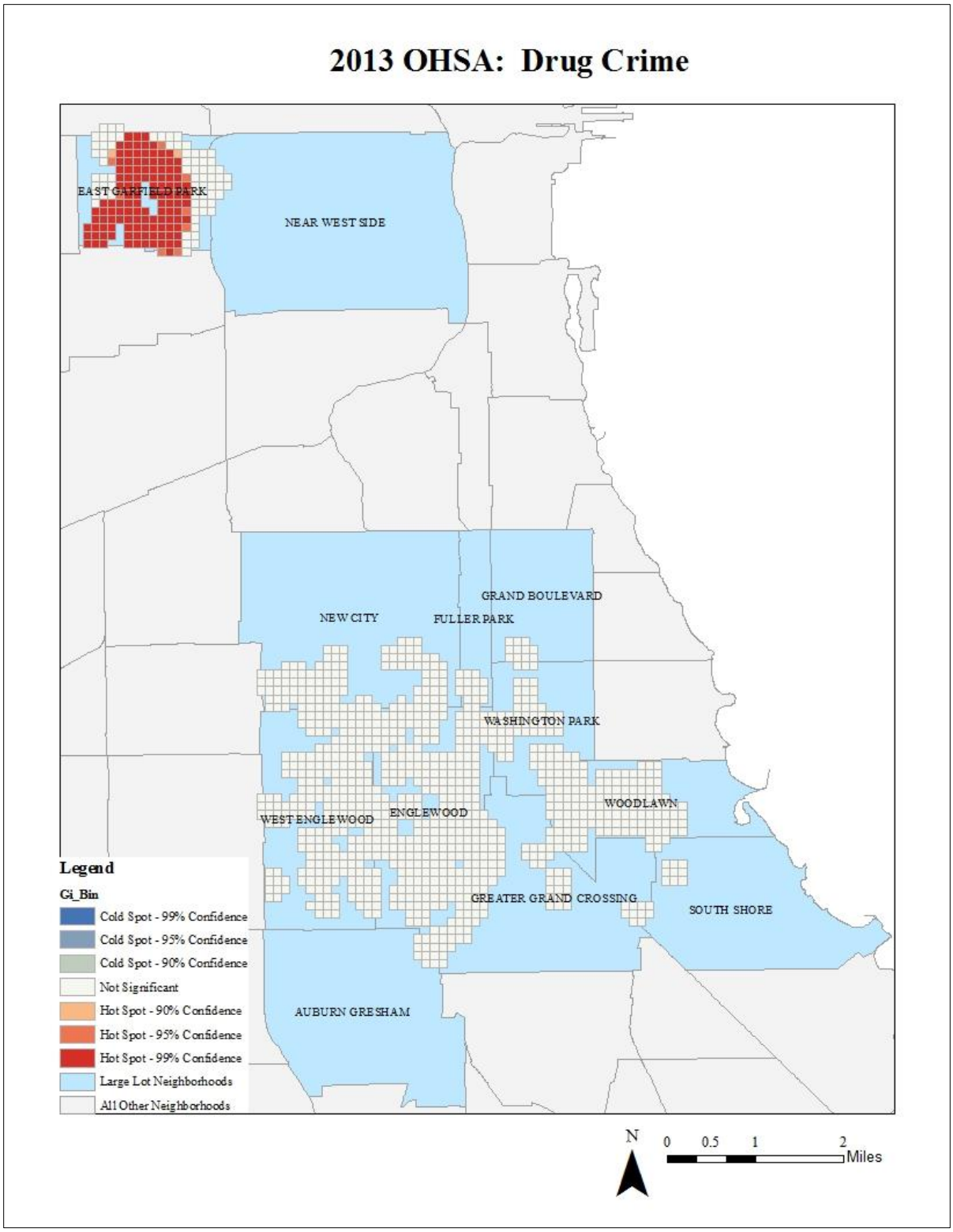

Figure 16- Optimized Hot Spot Analysis Results: 2013-Drug Crime

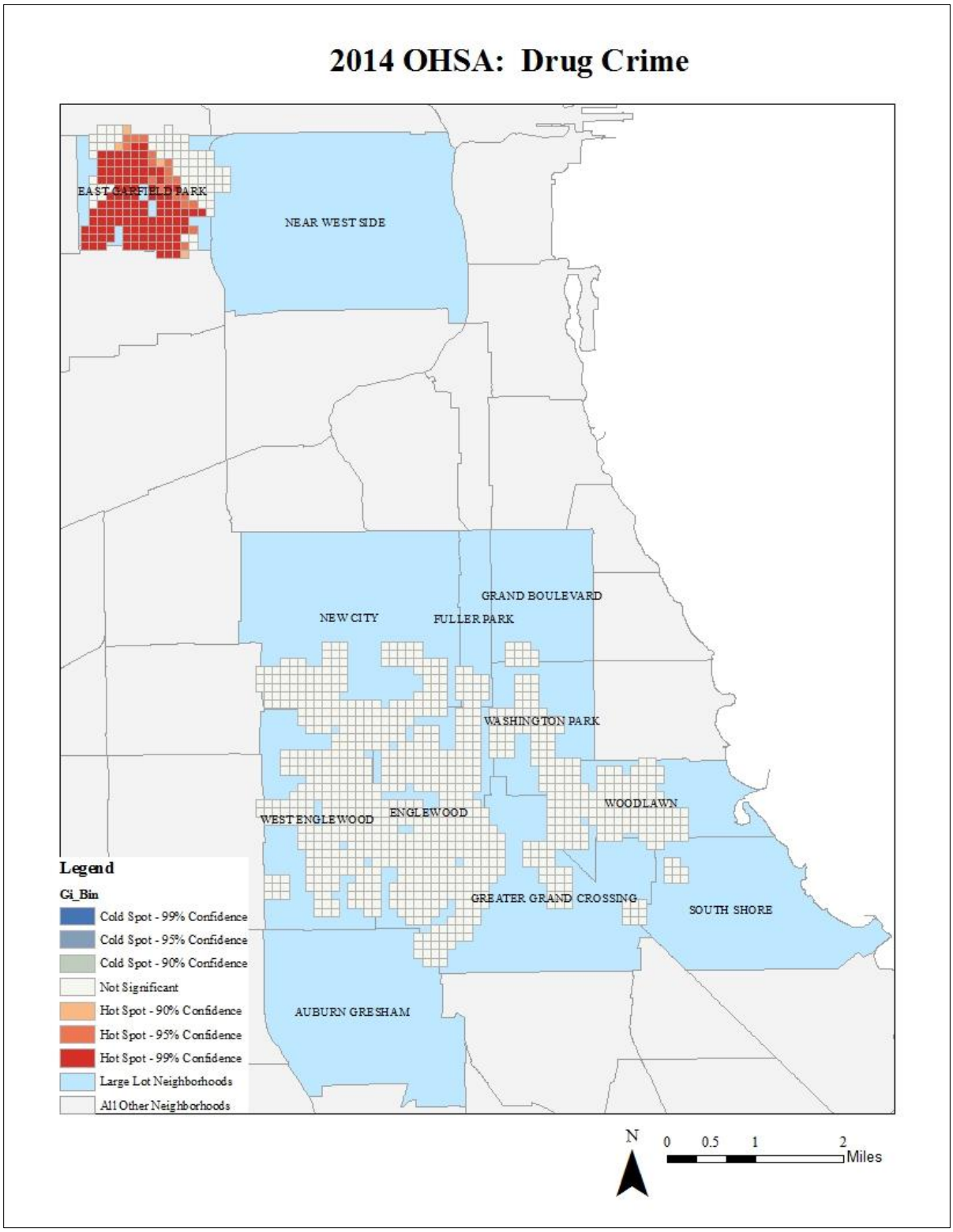

Figure 17- Optimized Hot Spot Analysis Results: 2014-Drug Crime

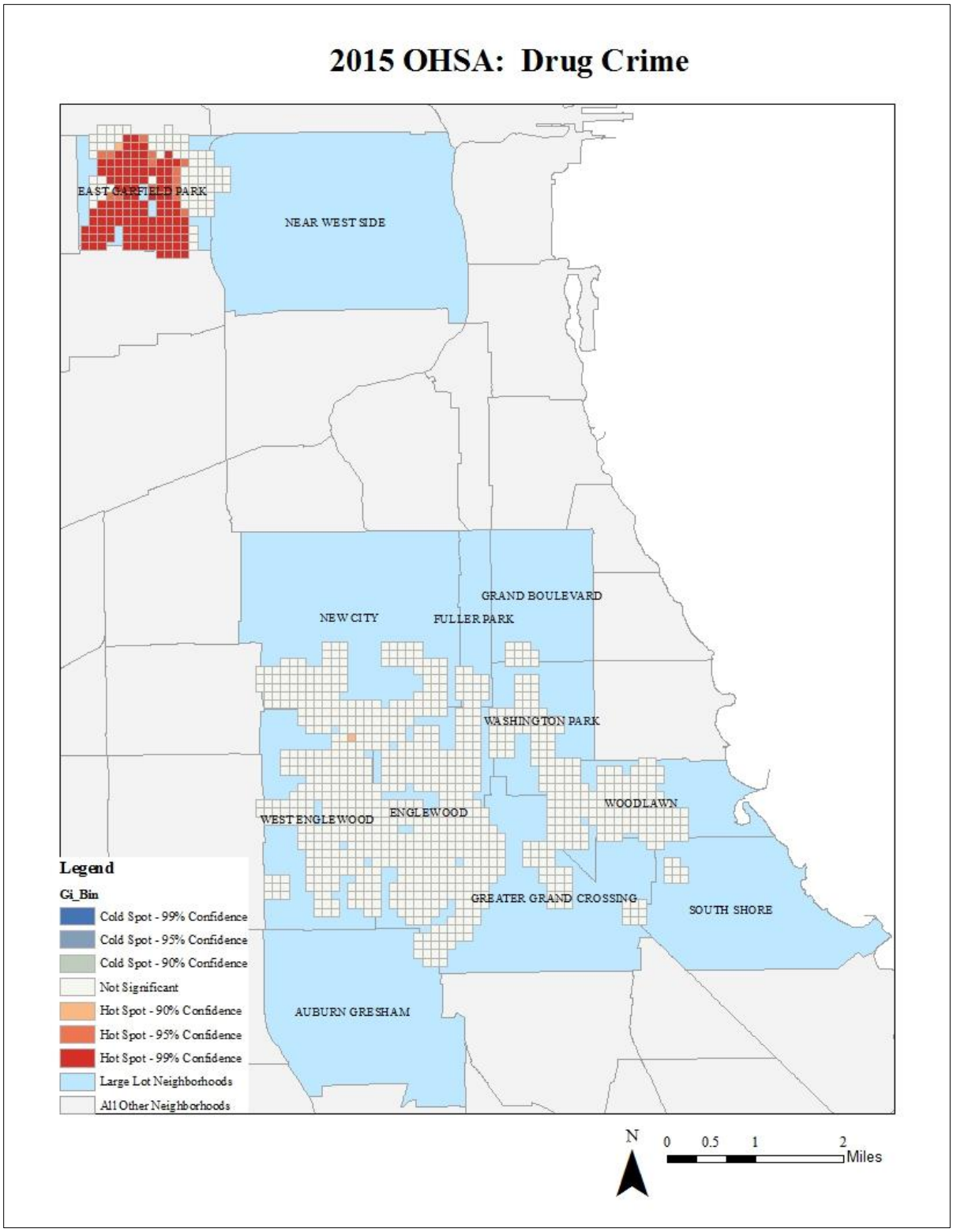

Figure 18- Optimized Hot Spot Analysis Results: 2015-Drug Crime

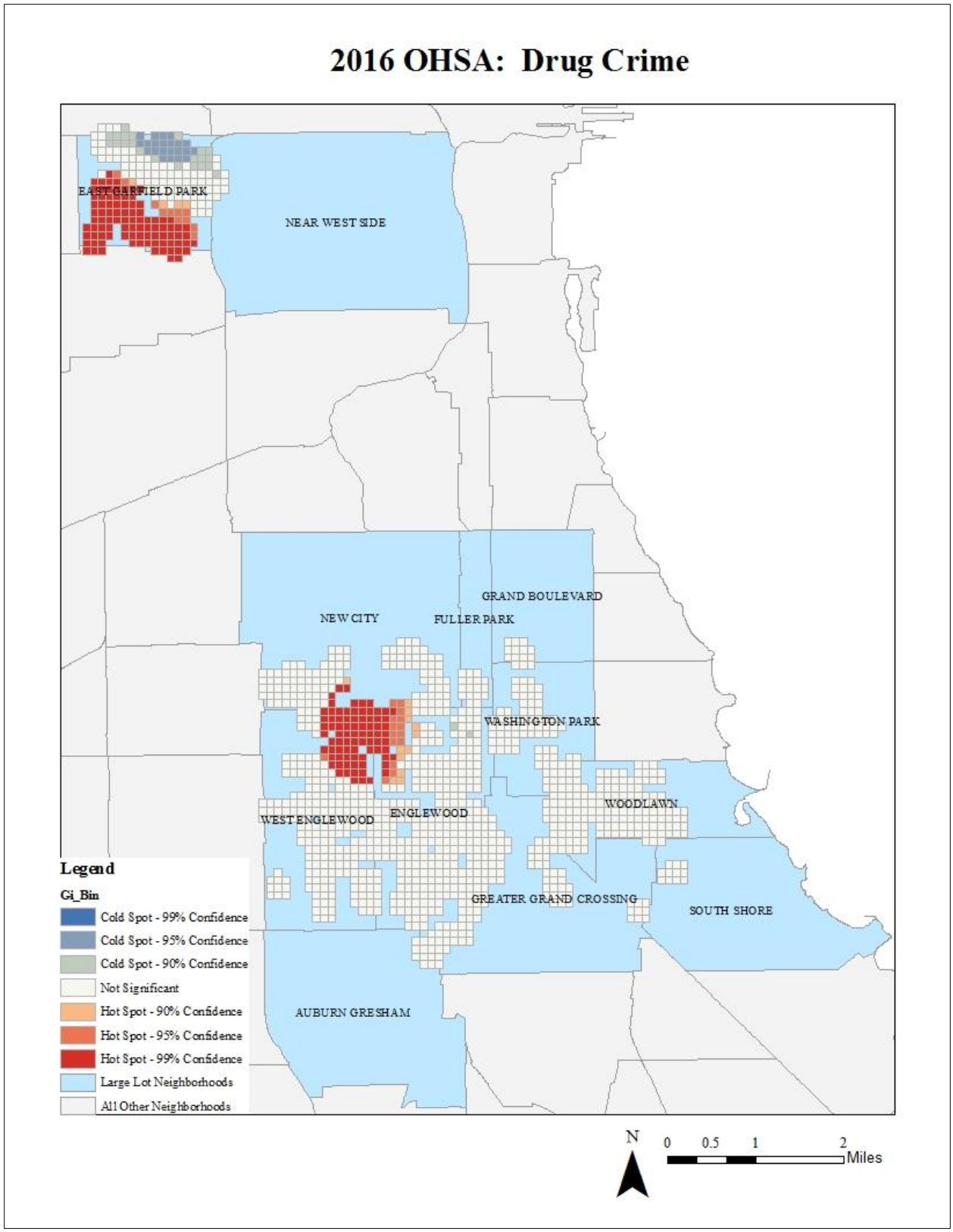

Figure 19- Optimized Hot Spot Analysis Results: 2016-Drug Crime

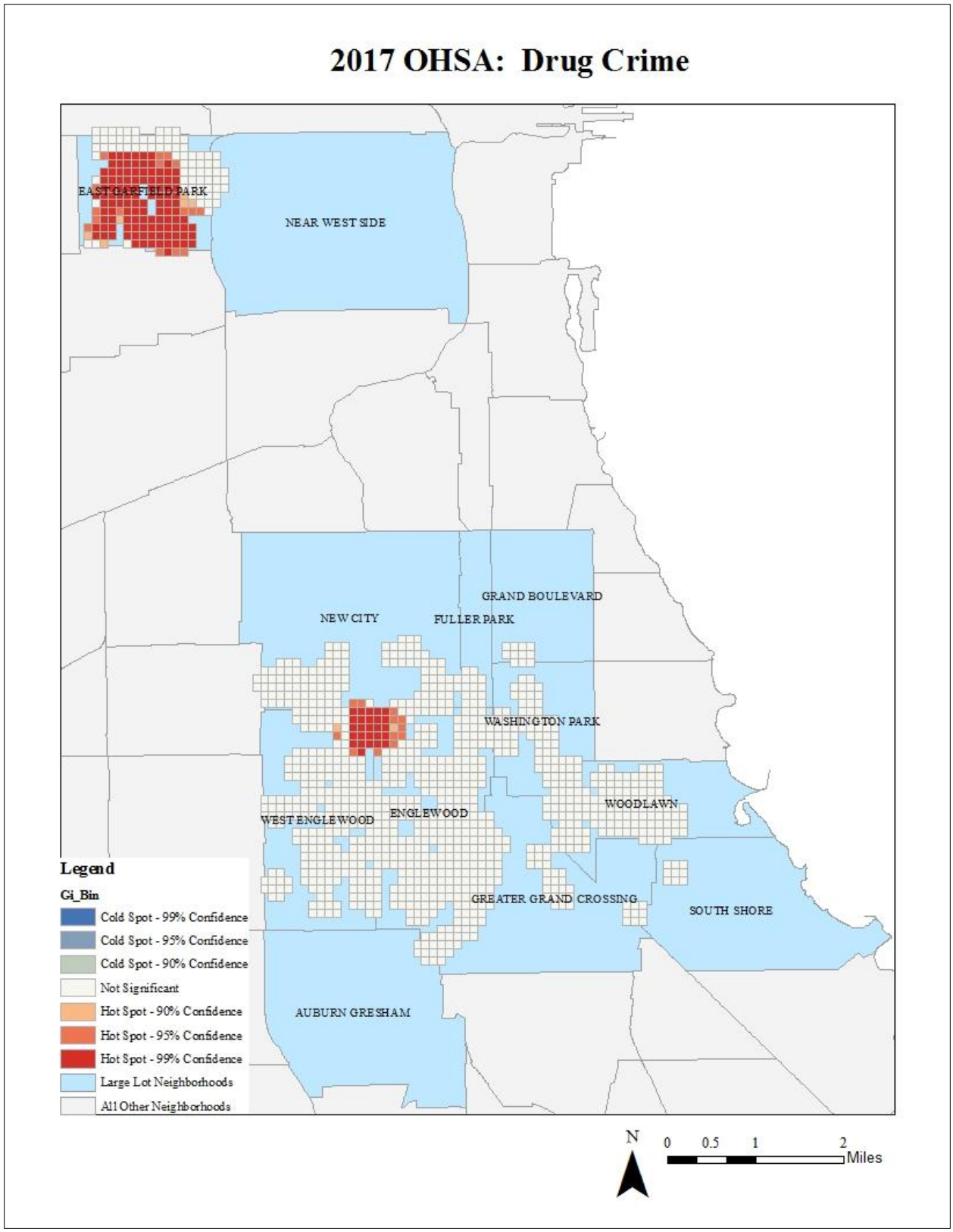

Figure 20- Optimized Hot Spot Analysis Results: 2017-Drug Crime

Conclusion

This paper found a statistically-significant reduction in property and drug crimes within 500 feet of sold 2014 Large Lots but not for violent crime. This does not mean that the Large Lot Program will never result in such an outcome for violent crimes. The study period included several of the most violent years in recent Chicago history. Other studies in this field that have found significant reductions in violent crime considered longer periods of time than this paper did. Over time, a similar outcome may also occur for the Large Lot Program and future studies should analyze whether this has happened.

This paper also did not specifically consider how the lots were used once they were sold and presumed that all of the new owners maintained the lots according to City and program standards. Kondo and others (2016) found significant reductions in violent crime for both lots that were used actively by the community, such as for community gardens, and those that were just cleaned up for private use. They did concede, however, that the significance of the outcome was reduced for lots that were merely cleaned up and not put into community reuse (Kondo et al., 2016). The Large Lot Program only requires cleaning up and other basic maintenance requirements. As mentioned earlier, Englewood resident Ms. Asiaha Butler transformed her lot into a community asset and violent crime apparently decreased locally. There may be a difference in how the lots were reused and this could have impacted the results.

Further research should also consider the neighborhoods individually and contrast the impact of the Large Lot Program on crime within one community area and not all of the areas the program's 2014 year covered. As clearly illustrated with many of the results, there were differing patterns of crime between the West Side's East Garfield Park neighborhood and the South Side neighborhoods. Further research into neighborhood conditions should also consider

2014 Large Lots' relations with lots sold in later years of the program and under other City vacant lot programs to see if there is a difference in crime within areas with a clustering of these lots in contrast to areas without such clusters. Research into neighborhood conditions should also analyze policing patterns and determine whether these patterns had any relation to the results.

Nevertheless, this paper's finding that property and drug crimes statistically significantly decreased within 500 feet of the lots sold in the 2014 Large Lot Program upholds this paper's premise that the return of vacant lots to local private management could reduce crime. While the program was not explicitly created to reduce crime, this could be a positive side effect to the Large Lot Program's purposes and a possible means to reduce urban crime.

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